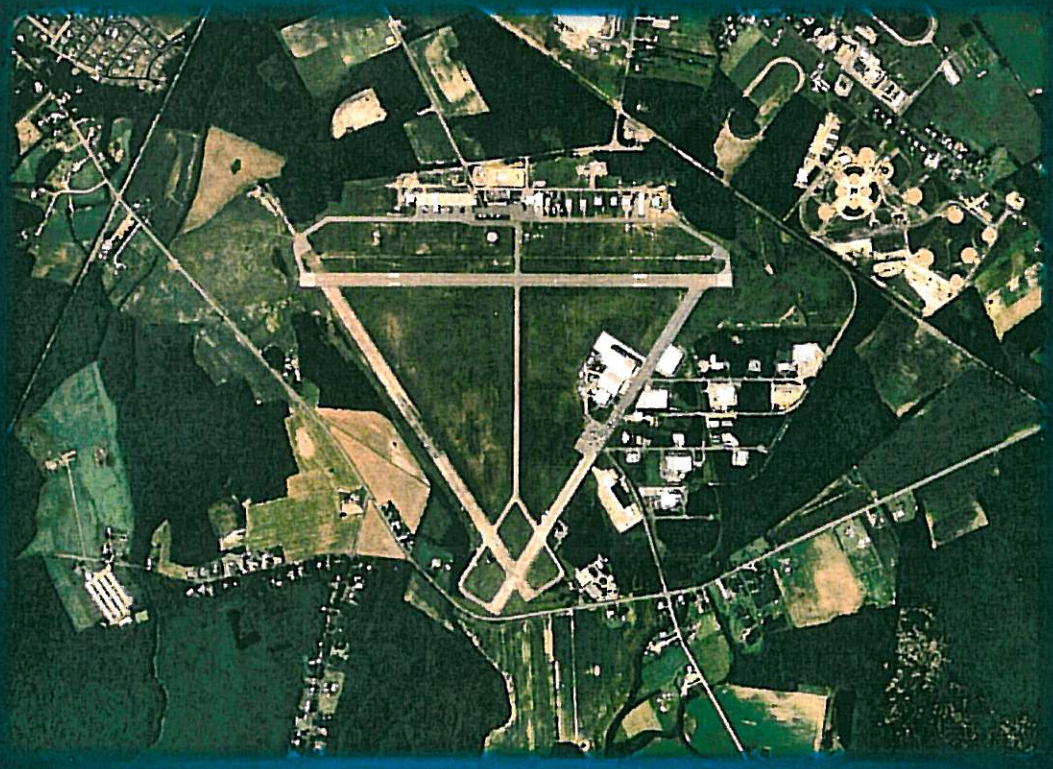
Runway Length Justification Study

Final Report



Sussex County Airport

Georgetown, Delaware

November 2010

Prepared for
Sussex County, Delaware

DELTA AIRPORT CONSULTANTS, INC.
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LIST OF EXHIBITS

Chapter One
PURPOSE AND NEED

This Runway Length Justification Study has been prepared to evaluate the need to extend the runway at Sussex County Airport (GED). This chapter specifies the underlying purpose and need for the project and consists of the following sections:

Airport Setting and Background – This section provides an overview of GED's physical setting, history, and role in the aviation community.

Description of Proposed Action – This section identifies the purpose and description of the project included in the proposed action.

Evaluation of Existing Operational Activity – The forecast for turbojet operations contained in the 2007 Master Plan (MP) Update will be reviewed and revised to reflect current trends at the airport.

Identification of Existing Critical Aircraft – This section will review FlightAware data to determine the critical aircraft.

Determination of Existing Airport Reference Code – GED is currently an ARC B-II facility. The MP Update recommended that Runway 4-22 be planned for C-II given the based and transient aircraft operating during the study period. This section will reevaluate this recommendation.

A. AIRPORT SETTING AND BACKGROUND

The Sussex County Airport is located in south-central Delaware approximately one mile east of the city of Georgetown and 15 miles inland from the Atlantic Ocean. The airport is operated by Sussex County and is under the direction of the Sussex County Engineering Department. Sussex County Airport is a general aviation airport serving a

broad business and personal aviation community. The airport currently has 55 based aircraft and serves approximately 47,000 civilian and military aircraft operations annually[1]. These operations include single-engine and twin-engine aircraft used for business, pleasure and flight training, as well as significant jet traffic including Boeing Business Jets (BBJ). Sussex County Airport is one of only two public use airports in Sussex County, and the only publicly owned airport in the County.

The FAA is required to publish the National Plan of Integrated Airport Systems (NPIAS) as mandated by the Airport and Airways Improvement Act of 1982. The NPIAS and the Delaware Aviation System Plan Update (DASPU) list Sussex County Airport as a general aviation airport. This FAA planning document is updated each two years and is intended to identify the nation's airport needs over a ten year planning period, representing a continuous planning effort. Likewise, the DASPU identifies the state's airport needs. The most recent update to the state plan was published in October, 2008. The Update forecasts Delaware's aviation needs for the period 2005-2025.

Sussex County Airport serves the Chesapeake Bay Region and the DASPU defines a service area for the airport that extends into Kent County to the north and across the state line into Maryland to the south.

The 2007 Master Plan (MP) Update defined the current Airport Reference Code (ARC) as B-II for Runway 4-22. The MP Update also defined the critical family of aircraft for GED as the medium size business jet, similar to the Hawker HS125 and Gulfstream III type aircraft. These aircraft represent approach category 'C' aircraft and over half of the operations by these aircraft represented Group II wingspan characteristics. Consequently, the MP Update recommended the primary runway (Runway 4-22) be planned for ARC C-II. This Justification Study will reevaluate this recommendation based upon current

[1] Based aircraft number and total operations are based upon approved forecast from the 2007 Master Plan Update and will remain the same throughout this study.

turbojet operations as detailed in the FlightAware data[2] obtained to document recent jet operations.

B. DESCRIPTION OF PROPOSED ACTION

This study addresses the ability of GED to meet forecasted growth and improve overall safety and efficiency. The 2007 MP Update for GED documented the need for a runway extension of the airport's primary runway, Runway 4-22, to 6,000 feet. Following completion of the MP Update, the FAA authorized Sussex County to proceed with the next steps in the development process which included an Environmental Assessment (EA) and Benefit Cost Analysis (BCA). During review of the BCA, it was determined that the current fleet mix at GED differs significantly from the approved forecast. Specifically, operational observations indicate the turbojet traffic has declined and that the previously identified critical aircraft may not be routinely operating at the airport. Consequently, the FAA has requested the completion of this Runway Length Justification Study to document the critical aircraft and existing jet traffic as well as update the costs associated with the proposed development. Additionally, the owner wishes to enhance the all-weather operating capability of the airport by reducing instrument approach minimums. This study will evaluate opportunities to reduce approach minimums for Runway 4 and the actions necessary to accomplish the reduction.

C. EVALUATION OF EXISTING OPERATIONAL ACTIVITY (TURBOJET ONLY)

The forecast of aeronautical activity at GED is a key element of the planning process. The FAA-approved forecast established the basis for determining and planning the airfield infrastructure and facility requirements necessary to adequately serve the community's current and future aviation needs.

[2] Digital files of FlightAware data used in this analysis are on file with the FAA, DelDOT Office of Aeronautics and Sussex County.

In addition to the forecast, data was received from FlightAware detailing actual instrument operations at the airport for the years 2006 through 2009. The data provided for 2006 and 2009 was limited to August 18th through December 31st and January 2st through August 19th, respectively. The data has been annualized in this report for purposes of comparison.

Table 1-1 compares the forecasted operations from the MP Update versus the actual operations reported by FlightAware.

Table 1-1
Sussex County Airport
Airport Turbojet Operations Comparison

Year	2007 Master Plan Forecast[3]	FlightAware Data
2006	n/a	1,459[1]
2007	3,154	1,334
2008	3,367	1,094
2009	3,580	917[2]

Sources:
2007 Master Plan Update, Delta Airport Consultants, Inc.
FlightAware Data, 2006-2009
[1] Data based on FlightAware data for 4 month period from August to December 2006 scaled for 12 months.
[2] Data based on FlightAware data for 8 month period from January to August 2009 scaled for 12 months.
[3] 2008-2009 operations were interpolated from approved forecast completed as part of the 2007 MP Update.

The FAA Aerospace Forecast, 2009-2025, established an average annual growth rate of 4.8 percent for the fixed-wing turbojet fleet, and a 3.9 percent average growth rate for the hours flown. Though the forecast does not project the number of operations, it is reasonable to assume that turbojet operations will follow in line with the fleet and hours flown increases, thus a 4.5 percent growth rate has been applied for purposes of this study. **Table 1-2** illustrates the turbojet forecast based on a growth rate of 4.5 percent.

Table 1-2
Sussex County Airport
Estimated Turbojet Operations Forecast

	2008	2012	2021
Turbojet	1,094	1,363	2,117

Sources: Flight Aware data
FAA Aerospace Forecast 2009-2025
Delta Airport Consultant Analysis

D. IDENTIFICATION OF EXISTING CRITICAL AIRCRAFT

The determination of the existing critical aircraft at GED will be useful to establish the airport reference code (ARC) for the airport. The critical aircraft is defined as the aircraft or family of aircraft with the largest wingspan and highest approach to landing speed that uses the airport on a regular basis. The FAA defines regular basis as more than 500 itinerant operations a year. In some cases, the critical aircraft may be two different aircraft where one aircraft establishes design criteria based on the largest wingspan and another establishes design criteria based on the highest approach to landing speed.

Table 1-3 presents a list of aircraft that typically operate at GED along with associated performance information.

Table 1-3
Sussex County Airport
Typical Aircraft

Aircraft Type	ARC	Approach Speed (kt)	Wing Span (ft)	Max Takeoff Weight (lb)
Beechjet	B-I	105	44	16,100
Citation CJ2	B-II	118	50	12,300
Citation Bravo (Cessna 550)	B-II	112	52	14,800
Citation V	B-II	98	52	15,900
Citation Excel	B-II	117	56	20,000
Falcon 2000	B-II	113	63	35,800
Lear Jet 31	C-I	124	44	16,500
Lear Jet 45	C-I	129	48	19,500
Westwind	C-I	129	44	23,500
Hawker	C-II	125	52	27,400
Citation X	C-II	131	64	35,700
Boeing 737 (BBJ)	C-III	140	95	171,000

Source: Flight Aware data, 2006-2009
Aircraft Characteristics, 9th Edition, Burns & McDonnell

Table 1-4 depicts the turbojet operations reflected in the FlightAware data for 2008.

Table 1-4
Sussex County Airport
2008 Turbojet Operations

	ARC					
Aircraft	**B-I**	**B-II**	**B-III**	**C-I**	**C-II**	**C-III**
BeechJet	56					
Citation I	15					
Citation CJ1	25					
Eclipse 500	5					
Premier I	18					
Citation CJ2		83				
Citation Bravo		56				
Citation V		79				
Citation Excel		216				
Citation III		5				
Falcon		63				
Albatros L39			2			
LearJet				91		
Westwind				34		
Gulfstream 100				10		
Hawker					75	
Citation Sovereign					65	
Citation X					53	
Challenger					21	
Canadair RJ-200					2	
Embraer 135/145					24	
Gulfstream 150/200					14	
Gulfstream II, III, IV					29	
Embraer 190						2
Global 5000						4
Boeing 737						47
TOTAL OPERATIONS[1]:	**119**	**502**	**2**	**135**	**283**	**53**

Source: Flight Aware data 2006-2009
Aircraft Characteristics, 9th Edition, Burns & McDonnell
Note: [1]FlightAware operations noted as blocked (251) were allocated based on percent of total operations; operation totals are estimated.

Table 1-4 demonstrates that greater than 500 operations exist for small business jet type aircraft classified as ARC B-II. **Based upon the above information, the existing critical aircraft for the planning period is the family of small business jets, represented by the Citation Excel and the Falcon 2000.**

E. DETERMINATION OF EXISTING AIRPORT REFERENCE CODE

Turbojet operations comprise approximately 1,100 of the total annual operations for 2008 with growth in excess of 2,100 forecasted for 2021. As mentioned previously, the critical family of aircraft for GED during the current planning period is the small business jet, similar to the Citation Excel and Falcon 2000. More than half of the operations by these aircraft represent category B aircraft and approximately 70 percent represent Group II wingspan characteristics.

Given the above information, airfield development for the Sussex County Airport should be planned based on an Airport Reference Code (ARC) B-II.

Chapter Two
RUNWAY LENGTH JUSTIFICATION

This section evaluates the runway length based on the existing and future aircraft expected to use the Sussex County Airport (GED). The recommendations are based on FAA advisory circulars (AC), specific manufacturers' aircraft performance data, and runway use limitations placed on fractional owner and on-demand operations such as Federal Aviation Regulation (FAR) Parts 91K and 135.

A. INTRODUCTION

The determination of runway length required for an airport is based on standards presented in FAA AC 150/5300-13, Chapter 3 and FAA AC 150/5325-4A, Runway Length Requirements for Airport Design. The recommended length for a primary runway at an airport is determined by considering either the family of airplanes having similar performance characteristics or a specific aircraft requiring the longest runway. This need is based on the aircraft or family of aircraft that use the airport on a regular basis, where regular basis is typically defined as a minimum 500 itinerant operations per year. Additional factors considered include critical aircraft approach speed, its maximum certificated take-off weight, useful load and length of haul, the airport's field elevation above sea level, the mean daily maximum temperature at the airfield, and typical runway surface conditions, such as wet and slippery.

B. SERVICE TO NATIONAL FLEET OF BUSINESS JETS

The initial analysis of recommended runway length for GED is based on performance curves developed from FAA approved airplane flight manuals in accordance with Federal Aviation Regulations. Guidance on runway length analysis is provided in AC 150/5325-4B, Runway Length Requirements for Airport Design. Tables 3-1 and 3-2 of the AC (see **Exhibits 2-1** and **2-2**) provide a listing of aircraft identified by the FAA to comprise 75 percent and 100 percent of the national fleet of corporate jets respectively.

Table 3-1. Airplanes that Make Up 75 Percent of the Fleet

Manufacturer	Model
Aerospatiale	Sn-601 Corvette
Bae	125-700
Beech Jet	400A
Beech Jet	Premier I
Beech Jet	2000 Starship
Bombardier	Challenger 300
Cessna	500 Citation/501Citation Sp
Cessna	Citation I/II/III
Cessna	525A Citation II (CJ-2)
Cessna	550 Citation Bravo
Cessna	550 Citation II
Cessna	551 Citation II/Special
Cessna	552 Citation
Cessna	560 Citation Encore
Cessna	560/560 XL Citation Excel
Cessna	560 Citation V Ultra
Cessna	650 Citation VII
Cessna	680 Citation Sovereign

Manufacturer	Model
Dassault	Falcon 10
Dassault	Falcon 20
Dassault	Falcon 50/50 EX
Dassault	Falcon 900/900B
Israel Aircraft Industries (IAI)	Jet Commander 1121
IAI	Westwind 1123/1124
Learjet	20 Series
Learjet	31/31A/31A ER
Learjet	35/35A/36/36A
Learjet	40/45
Mitsubishi	Mu-300 Diamond
Raytheon	390 Premier
Raytheon Hawker	400/400 XP
Raytheon Hawker	600
Sabreliner	40/60
Sabreliner	75A
Sabreliner	80
Sabreliner	T-39

SOURCE:
ADVISORY CIRCULAR (AC 150/5325-4B TABLE 3-1, DATED 07-01-2005) PROVIDED BY FAA (FEDERAL AVIATION ADMINISTRATION - WWW.FAA.GOV).

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75 PERCENT FLEET
SUSSEX COUNTY AIRPORT

DRAWN BY: LKH | CHECKED BY: KSK | SCALE: NONE | DATE: NOVEMBER 2010

EXHIBIT 2-1

DRAWING: 09132-exh-75-percent_fleet.dwg LAYOUT: L-1

Table 3-2. Remaining 25 Percent of Airplanes that Make Up 100 Percent of Fleet

Manufacturer	Model
Bae	Corporate 800/1000
Bombardier	600 Challenger
Bombardier	601/601-3A/3ER Challenger
Bombardier	604 Challenger
Bombardier	BD-100 Continental
Cessna	S550 Citation S/II
Cessna	650 Citation III/IV
Cessna	750 Citation X
Dassault	Falcon 900C/900EX
Dassault	Falcon 2000/2000EX
Israel Aircraft Industries (IAI)	Astra 1125
IAI	Galaxy 1126
Learjet	45 XR
Learjet	55/55B/55C
Learjet	60
Raytheon/Hawker	Horizon
Raytheon/Hawker	800/800 XP
Raytheon/Hawker	1000
Sabreliner	65/75

NOTE: AIRPLANES IN TABLES 3-1 AND 3-2 COMBINE TO COMPRISE 100% OF THE FLEET.

SOURCE:
ADVISORY CIRCULAR (AC 150/5325-4B TABLE 3-2, DATED 07-01-2005) PROVIDED BY FAA (FEDERAL AVIATION ADMINISTRATION - WWW.FAA.GOV).

Table 2-1 illustrates the aircraft and operations at GED as recorded from FlightAware data in the remaining 25 percent of aircraft that make up the 100 percent fleet, as well as larger aircraft that are exceptions to the typical GA fleet, such as the Boeing BBJ (B-737) and regional jets.

Table 2-1
Sussex County Airport
Operations by 100 Percent Fleet or Larger Aircraft (2008)

Aircraft	Top 25% of 100% Fleet	2008 Operations
Challenger 600/601/604	✓	8
Citation III	✓	5
Citation X	✓	53
Falcon 2000	✓	59
Gulfstream 100 (Astra)	✓	10
Gulfstream 200 (Galaxy)	✓	14
Hawker 800	✓	68
Hawker 1000	✓	7
LearJet 60	✓	18
Boeing BBJ (B-737)		47
Embraer 135/145		24
Embraer 190		2
Gulfstream II, III, IV		29
SUBTOTAL		**344**
Citation Excel (Part 135)		188
TOTAL OPERATIONS[1]		**532**

Source: FlightAware data, 2008.
Note: [1]FlightAware operations noted as blocked (251) were allocated based on percent of total operations; operation totals are estimated.

As depicted in Table 2-1, there are 344 demonstrated operations within the top 25 percent fleet or larger aircraft. In addition, approximately 188 Citation Excel operations are provided by NetJets and CitationShares, LLC operating under Part 135, and consequently, subject to CFR Part 135.385, *Landing Limitations: Destination Airports* (commonly referred to as the "60 Percent Rule"). This regulation requires that the arriving turbojet aircraft must be able to land within 60 percent of the effective runway length, or if the runway is wet and slippery, the effective runway length must be at least 115 percent of the runway length required for that specific aircraft operation.

These combined operations demonstrate that greater than 500 operations exist for the most demanding fleet serving GED. **Given the documented transient jets operating at GED, the 100 percent fleet table should be used for determining runway length requirements.**

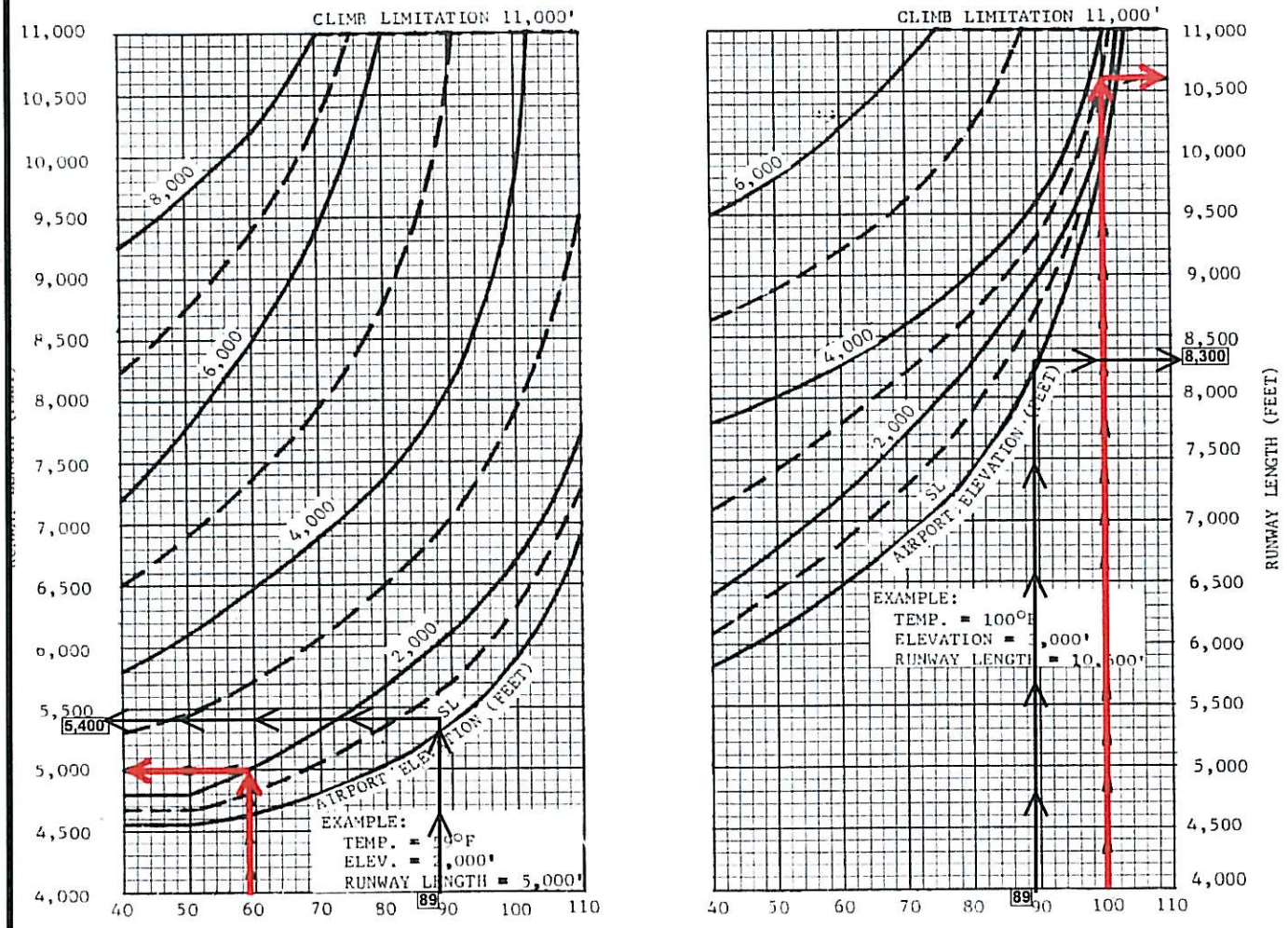
C. FAA RUNWAY LENGTH MODELS

Having defined 100 percent of the fleet as appropriate for the GED analysis, the useful load factor of these aircraft is also considered. The mean daily maximum temperature (89°F) and the airfield elevation (53 MSL) are used in **Exhibit 2-3** to determine a runway length requirement of approximately 5,400 feet for the 60 percent useful load and approximately 8,300 feet for the 90 percent useful load.

The runway length analysis for GED was also performed using FAA Airport Design Computer Program 4.2D and procedures outlined in FAA AC 150/5300-13. The program includes an aircraft fleet profile designed to be representative of the small and large aircraft that comprise the general aviation aircraft fleet in the United States. In addition to the analysis presented in Exhibit 2-3, the design program considers the longitudinal grade of the runway as well as wet and dry conditions. The program produced a recommended runway length with wet and slippery conditions of 5,500 feet to accommodate 100 percent of large aircraft at 60 percent useful load and a length of 8,270 feet to accommodate the 100 percent fleet at 90 percent useful load (see **Table 2-2**) for GED.

For purposes of this analysis, the term *useful load* refers to the difference between the maximum allowable structural gross weight and the operating empty weight of the aircraft in question. FAA guidelines require the selection of 60 percent or 90 percent useful load to be based on the length of haul and service needs of the family of critical design aircraft, and notes that the 60 percent useful load table is to be used for those airplanes operating with no more than a 60 percent useful load factor. The 60 percent tables are used in this analysis for planning purposes given no specific operator detail was collected in this study.

Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load **100 percent of feet at 90 percent useful load**

LEGEND

GED SPECIFIC CALCULATION

FAA SAMPLE CALCULATION

SOURCE:
ADVISORY CIRCULAR (AC 150/5325-4B FIGURE 3-2, DATED 07-01-2005) PROVIDED BY FAA (FEDERAL AVIATION ADMINISTRATION - WWW.FAA.GOV).

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DRAWN BY:	LKH	CHECKED BY:	KSK	SCALE:	NONE	DATE:	NOVEMBER 2010

RUNWAY LENGTH REQUIRED
SUSSEX COUNTY AIRPORT

EXHIBIT
2-3

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Table 2-2
Sussex County Airport
FAA Airport Design Runway Length Requirements

AIRPORT RUNWAY DATA	
Airport Elevation (MSL)	53'
Mean daily temperature of the hottest month	89° F
Maximum difference in runway centerline elevation	5'
Length of haul for airplanes of more than 60,000 pounds	500 miles
Runway Length Recommended for Airport Design	
Small airplanes with approach speeds of less than 30 knots	300'
Small airplanes with approach speeds of less than 50 knots	800'
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	2,510'
95 percent of these small airplanes	3,070'
100 percent of these small airplanes	3,640'
Small airplanes with 10 or more passenger seats	4,250'
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,350'
75 percent of these large airplanes at 90 percent useful load	7,000'
100 percent of these large airplanes at 60 percent useful load	5,500'
100 percent of these large airplanes at 90 percent useful load	8,270'
Airplanes of more than 60,000 pounds	5,030'

Source: FAA Airport Design Computer Program 4.2D.

D. AIRCRAFT PERFORMANCE ANALYSIS

Based on FlightAware data, approximately half of the operations in the top 25 percent fleet or larger are operated by charter companies. Consequently, the 60 percent rule for landing distance should be considered when examining runway length. **Table 2-3** notes the landing distance required at GED provided by NetJets for their Part 135 fleet.

Table 2-3
Sussex County Airport
Landing Distance Required – NetJets Part 135 Fleet

Aircraft	Factored Landing Distance (feet)
Citation X	5,991
Citation Excel	5,526
Gulfstream 2000	5,402
Hawker 400XP	5,318
Gulfstream IV-SP	5,304
Falcon 2000	5,212

Source: NetJets Analysis, 2009.
Assumptions: 30 degree day, dry conditions.
Aircraft configured at max landing weight.
Factored landing distance is Part 135, 60% landing distance.

As illustrated in the above table, both the Citation Excel and Falcon 2000, which represent the GED critical family of aircraft, require a landing length greater than the existing runway length when operating under CFR 14 Part 135.385.

In reviewing the runway length requirements produced from the FAA performance charts, computer program, and user performance analysis, **the existing useable primary runway length of 5,000 feet was found to be inadequate to accommodate the turbojet fleet currently operating at GED.**

E. STAGE LENGTH

In addition to analysis of useful loads, stage length is also a key factor in determining runway length. FlightAware data documents more than 250 aircraft departing GED for trips with stage lengths of approximately 500 nautical miles, thus this distance was used in the computer analysis presented in Table 2-2.

F. CONCLUSION

In summary, this section has demonstrated the need to extend Runway 4-22 at GED beyond the existing 5,000 feet consistent with FAA guidance. This need is supported by identification of the "family of small size business jets" as the critical aircraft (represented by the Citation Excel and the Falcon 2000 aircraft) as well as several other factors including:

- Service to the 100 percent fleet of U.S. business jets and larger; and
- Runway length determination for the 100 percent fleet and Part 135 operations.

Additionally, there are significant intangible reasons for extending the runway length, including:

- To more fully meet the user service needs;
- Enhancement of overall operational safety; and
- Increase to the airport's weather capability.

Based on analysis of operational detail and performance charts, **it is recommended that a runway length of 5,500 feet be considered as the critical length requirement and be used as the basis for primary runway planning at GED.**

Runway 4-22 is 150 feet wide which is adequate to serve the airport's family of critical aircraft throughout the planning period.

This chapter describes the process used to identify reasonable alternatives meeting the purpose and need for the sponsor's proposed action described in Chapter One. The three alternatives presented include a no-build and two build concepts; the no-build addresses the minimum action required to achieve FAA design standards. The build alternatives propose a 5,500 foot runway length (500 foot extension) for Runway 4-22 as justified in Chapter Two, Runway Length Justification. This chapter consists of the following elements:

Existing Obstruction Removal and Mitigation – This section describes the existing obstructions as identified in the 2009 Obstruction Study completed by Urban Engineers, Inc.

No Build Alternative – This section evaluates the runway in its current configuration however, the alternative does not meet the purpose and need.

Build Alternatives – This section evaluates the build alternatives to achieve the justified runway length based upon the critical family of aircraft identified in this study.

Selection of the Preferred Alternative – The preferred alternative is identified on a comparative basis of each alternative's ability to meet the project purpose and need, while minimizing adverse impacts.

A. EXISTING OBSTRUCTION REMOVAL AND MITIGATION

Existing obstruction removal and mitigation is presented in this section as it is a project that must be completed regardless of the proposed runway extension. Consequently, the costs associated with the existing removal and mitigation are not included as part of the build alternatives.

Federal Aviation Regulations 14 CFR Part 77, Objects Affecting Navigable Airspace, establishes standards for determining obstructions in navigable airspace; sets forth the requirements for

notice to the FAA Administrator of certain proposed construction or alteration; provides for aeronautical studies of obstructions to air navigation, to determine their effect on the safe and efficient use of airspace; provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and provides guidance for establishing antenna farm areas. Any existing fixed or mobile objects are, and future objects may be, obstructions to air navigation if they are of greater height than any of the heights or surfaces outlined in 14 CFR Part 77.23. The determination of whether an 'obstruction' is actually a 'hazard to air navigation' is accomplished through an aeronautical study conducted by the FAA. The standards apply to all objects, whether manufactured, objects of natural growth, or terrain.

FAA Advisory Circular (AC) 70/7460-1 provides information to persons proposing to erect or alter an object that may affect the navigable airspace. It explains the need to notify the FAA before construction begins and the FAA's response to such notice as required by 14 CFR Part 77. This requirement applies to activities on, and off, airport property, for distances including but not limited to, 20,000 feet from the nearest point of a runway. The airport owner/operator has the responsibility to ensure the aerial approaches to the airfield are adequately cleared and protected.

Existing obstruction data for GED is based on an aerial survey conducted during the fall of 2008 by Urban Engineers, Inc. The survey data identified groups of trees that exist on and off airport property that penetrate the 14 CFR Part 77 surfaces. The existing penetrations should be removed as soon as possible and are a common project element to the no-build and build alternatives.

B. ALTERNATIVE 1 – NO BUILD

Under the No Build alternative, the runway length would remain as it exists today with exception to a reduction in landing distance available for Runway 22. The reduction is due to displacement of the threshold in order to achieve compliance with 14 CFR Part 77 to meet vertical height requirements over the existing railroad. Obstruction removal to achieve compliance with 14 CFR Part 77 would also be completed as well as the control of RPZs via land acquisition. The No Build alternative would require an estimated 0.1 acres of fee simple acquisition to achieve the

recommended RPZ control and 17 acres of avigation easement to remove existing natural growth obstructions.

As existing obstructions are located within delineated wetland areas, approximately 2.7 acres of wetland impacts would occur with the implementation of Runway Development Alternative 1.

The alternative can be developed at an estimated cost of $645,000, see **Table 3-1** for details. **Exhibit 3-1** illustrates this alternative.

Advantages:

- Least cost option.
- Natural growth obstructions removed to enhance operational safety.
- Minimal land acquisition required.

Disadvantages:

- Does not achieve the recommended runway length of 5,500 feet.
- Approximately 2.7 acres of wetland impacts due to existing obstruction removal.

Table 3-1
Sussex County Airport
Runway Alternative 1 Estimated Costs

NO.	PROJECT	ESTIMATED COSTS
1	Land Costs[1]	$175,000
2	Clearing/Grubbing (existing obstructions)	$200,000
3	Wetland Mitigation[2]	$270,000
	ESTIMATED TOTAL ALTERNATIVE 1	**$645,000**

Note: [1]Land costs estimated using $40,000 per acre for fee simple and avigation easement costs were based upon $10,000 per acre (25% of fee simple cost); based upon information from County.
[2]Wetland mitigation was estimated using a 2:1 mitigation ratio at $50,000 per acre. Actual costs will be determined during the permitting process.
Source: Delta Airport Consultants, Inc.

EXISTING RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

EXISTING RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED EASEMENT (8± ACRES)

IMPACTED WETLANDS (0.1± ACRES)

IMPACTED WETLANDS (0.3± ACRES)

IMPACTED WETLANDS (1± ACRES)

PROPOSED OBSTRUCTION LIGHT

EXISTING RUNWAY 4-22 (5,000' X 150')

PROPOSED FEE SIMPLE ACQUISITION (0.1± ACRES)

PROPOSED EASEMENT (9± ACRES)

IMPACTED WETLANDS (0.1± ACRES)

IMPACTED WETLANDS (1.2± ACRES)

PROPOSED RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED KING FARM DEVELOPMENT

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	SURVEYED BOUNDARY (SEE NOTE 1)	
	COUNTY OWNED PROPERTY (SEE NOTE 2)	NA
	PAVEMENT	
RPZ	APPROACH RUNWAY PROTECTION ZONE	RPZ
NA	DEPARTURE RUNWAY PROTECTION ZONE	RPZ
ROFA	RUNWAY OBJECT FREE AREA	ROFA
RSA	RUNWAY SAFETY AREA	RSA
	AVIGATION EASEMENT	
NA	FEE SIMPLE ACQUISITION	
	OBSTRUCTION AREAS	NA
	WETLANDS (SEE NOTE 3)	NA
	WETLANDS (SEE NOTE 4)	NA
	WETLANDS (SEE NOTE 6)	NA
	IMPACTED WETLANDS	NA

DECLARED DISTANCES

RUNWAY END ID	ASDA	LDA	TORA	TODA
RUNWAY 4	5,000	5,000	5,000	5,000
RUNWAY 22	5,000	4,830	5,000	5,000

NOTES:

1. AIRPORT BOUNDARY BASED ON SEALED SURVEY BY MCCRONE LAN SURVEY 2002.
2. GENERAL AREA OF COUNTY OWNED PROPERTY 2010 (PROVIDED BY AIRPORT OWNER).
3. WETLANDS WERE DELINEATED AND SURVEYED BY RETTEW ASSOCIATES, INC.(MARCH 2007). A JURISDICTIONAL DETERMINATION IS PENDING.
4. WETLANDS WERE DELINEATED AND SURVEYED BY HILLIS-CARNES ENGINEERING, INC. IN LATE SUMMER AND FALL OF 2000. THE ARMY CORPS OF ENGINEERS JURISDICTIONAL DETERMINATION WAS OBTAINED ON JUNE 11, 2003.
5. PROPOSED KING FARM DEVELOPMENT PLANIMETRICS WERE PROVIDED BY SUSSEX COUNTY (OCT. 2010)
6. WETLANDS WERE DELINEATED AND SURVEYED BY JCM ENVIRONMENTAL (2007).

800 0 800 1600

SCALE: 1"=800' FEET

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RUNWAY 4-22 NO BUILD - ALTERNATIVE 1
SUSSEX COUNTY AIRPORT

DRAWN BY:	LKH	CHECKED BY:	RGL	SCALE:	1" = 800'	DATE:	NOVEMBER 2010

EXHIBIT 3-1

C. BUILD ALTERNATIVES

1. Common Aspects Of Build Alternatives

As several of the development objectives and consultant recommendations are common to both build alternatives, they are presented in this section of the text, and omitted from repetitive presentation within each alternative. Although the need to extend Runway 4-22 is a common item among both build alternatives, the approach to achieving the required length differs and thus, the runway extension issues form the framework for evaluating the alternatives.

a. Acquisition of Controlling Interest in RPZs

Runway Protection Zones (RPZs) are areas off the runway end to enhance the protection of people and property on the ground. This function is achieved through airport owner control over the RPZ areas. Such control includes the clearing and maintenance of incompatible objects and activities. While the FAA prefers that all objects be cleared from the RPZ, some uses are permitted, provided they do not attract wildlife. Land uses prohibited from the RPZ include residences and places of public assembly, as well as fuel storage facilities (Ref: FAA AC 150/5300-13, Paragraph 212).

Existing land survey information indicates that GED does not currently control all property within the RPZ areas. Fee simple acquisition is the preferred method of control, and is recommended. FAA AC 150/5300-13, Chapter 2, provides specific recommendations related to compatible land use within an RPZ. While the FAA prefers that the airport own all of the land within the RPZs, a combination of fee simple land acquisition and avigation easement is recommended for control of the Runway 22 RPZ as auto parking for an athletic sports park occupies much of the area. Estimated acreage and future acquisition needs for RPZ areas at GED are provided with each alternative.

Both Alternatives 2 and 3 propose to implement visibility minima of greater than or equal to ¾ miles for Runway 4. This action will result in a larger RPZ area than exists today, and consequently, require land acquisition.

b. Displacement of Runway Thresholds

The threshold locations for Runways 4 and 22 are dictated by the 14 CFR Part 77 vertical clearance requirements over the railroad to the north and Truck Route 9 to the south. The vertical clearance requirement over the railroad is 23 feet resulting in a need to displace the Runway 22 threshold 170 feet from the north end of existing pavement. The vertical clearance requirement over Truck Route 9 is 15 feet resulting in an ability to locate the Runway 4 threshold 130 feet south of the existing threshold in conjunction with the runway extension.

c. Establishment of Declared Distances to Achieve 5,500' Useable Runway Length

The proposed runway threshold locations provide 4,960 feet of unconstrained use runway; the establishment of declared distances with a displaced threshold of 170 feet for Runway 22 and 370 feet for Runway 4 provides the recommended 5,500 feet of runway for Accelerate Stop Distance Available (ASDA) in both directions as noted in **Table 3-2**. The Landing Distance Available (LDA) is as great as 5,330 feet, meeting the requirements of the critical family of aircraft for most dry and wet runway conditions under 14CFR Part 91-K and Part 135 operations.

Table 3-2
Sussex County Airport
Proposed Declared Distances

RUNWAY END ID	ASDA	LDA	TORA[1]	TODA[2]
RWY 4	5,500'	5,130'	5,500'	5,500'
RWY 22	5,500'	5,330'	5,500'	5,500'

Notes: [1] TORA – Takeoff Run Available - The length of runway declared available and suitable for the ground run of an airplane taking off.
[2] TODA - The length of the takeoff run available plus the length of the clearway, if clearway is provided.
Source: Delta Airport Consultants, Inc.

2. Alternative 2

Alternative 2 proposes to extend Runway 4-22 and the parallel taxiway 200 feet to the north and 300 feet to the south, to provide the recommended 5,500 feet of runway length.

Approximately five (5) acres of fee simple acquisition would be required for control of the Runway 4 RPZ and approximately one (1) acre of fee simple is required for the Runway 22 RPZ. No additional avigation easement acquisition would be necessary to clear obstructions due to the proposed runway extension as the obstructions are located on existing airport or County property and areas which avigation easement would be purchased to clear existing obstructions.

Approximately one (1) acre of wetland impacts is associated with the construction of this alternative. Delineated wetlands impacts would be caused by obstruction removal and grading north of the Runway 22 threshold.

The alternative can be developed at an estimated cost of $6.5 million, see **Table 3-3** for details. **Exhibit 3-2** illustrates this alternative.

Advantages:

- Obstructions removed to enhance operational safety.
- Runway length increased to 5,500 feet.

Disadvantages:

- Approximately one acre of wetland impacts due to Runway 22 extension and obstruction removal.

Table 3-3
Sussex County Airport
Runway Alternative 2 Estimated Costs

NO.	PROJECT	ESTIMATED COSTS
1	Runway Extension (including safety area)	$5,700,000
2	Install MALS	$400,000
3	Land Costs[1]	$240,000
4	Clearing/Grubbing[2]	$30,000
5	Wetland Mitigation[3]	$100,000
	ESTIMATED TOTAL ALTERNATIVE 3	**$6,470,000**

Note: [1]Land costs estimated using $40,000 per acre for fee simple and avigation easement costs were based upon $10,000 per acre (25% of fee simple cost); based upon information from County.
[2]Cost estimated for removal of obstructions in addition to those identified in Alternative 1 as 'existing'.
[3]Wetland mitigation was estimated using a 2:1 mitigation ratio at $50,000 per acre. Actual costs will be determined during the permitting process.
Source: Delta Airport Consultants, Inc.

EXISTING RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) (500' X 700' X 1,000')

PROPOSED APPROACH RUNWAY PROTECTION ZONE, VISIBILITY ≥ 3/4 MILE (1,000' X 1,510' X 1,700')

EXISTING RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED OBSTRUCTION AREA (1± ACRES)

PROPOSED EASEMENT (8± ACRES)

IMPACTED WETLANDS (0.1± ACRES)

PROPOSED FEE SIMPLE ACQUISITION (0.5± ACRES)

PROPOSED IMPACTED WETLANDS (1± ACRES)

PROPOSED FEE SIMPLE ACQUISITION (0.9± ACRES)

RELOCATED PAPI

EXISTING PAPI

EXISTING RUNWAY 4-22 (5,000' X 150')
PROPOSED RUNWAY 4-22 (5,500' X 150')

EXISTING PAPI

RELOCATED PAPI

PROPOSED EASEMENT (9± ACRES)

IMPACTED WETLANDS (0.3± ACRES)

PROPOSED OBSTRUCTION AREA (0.1± ACRES)

PROPOSED IMPACTED WETLANDS (0.1± ACRES)

IMPACTED WETLANDS (1± ACRES)

PROPOSED FEE SIMPLE ACQUISITION (4± ACRES)

IMPACTED WETLANDS (0.01± ACRES)

PROPOSED OBSTRUCTION AREA (4± ACRES)

PROPOSED OBSTRUCTION AREA (0.4± ACRES)

PROPOSED OBSTRUCTION LIGHT

IMPACTED WETLANDS (1.2± ACRES)

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED KING FARM DEVELOPMENT

IMPACTED WETLANDS (0.1± ACRES)

LEGEND		
EXISTING	DESCRIPTION	PROPOSED
	SURVEYED BOUNDARY (SEE NOTE 1)	
	COUNTY OWNED PROPERTY (SEE NOTE 2)	NA
	PAVEMENT	
RPZ	APPROACH RUNWAY PROTECTION ZONE	RPZ
NA	DEPARTURE RUNWAY PROTECTION ZONE	RPZ
ROFA	RUNWAY OBJECT FREE AREA	ROFA
RSA	RUNWAY SAFETY AREA	RSA
	DEMOLITION	NA
	AVIGATION EASEMENT	
NA	FEE SIMPLE ACQUISITION	
	OBSTRUCTION AREAS	
	WETLANDS (SEE NOTE 3)	NA
	WETLANDS (SEE NOTE 4)	NA
	WETLANDS (SEE NOTE 6)	NA
	IMPACTED WETLANDS	NA

DECLARED DISTANCES (FT)				
RUNWAY END ID	ASDA	LDA	TORA	TODA
RUNWAY 4	5,500	5,330	5,500	5,500
RUNWAY 22	5,500	5,130	5,500	5,500

NOTES:

1. AIRPORT BOUNDARY BASED ON SEALED SURVEY BY MCCRONE LAND SURVEY 2002.
2. GENERAL AREA OF COUNTY OWNED PROPERTY 2010 (PROVIDED BY AIRPORT OWNER).
3. WETLANDS WERE DELINEATED AND SURVEYED BY RETTEW ASSOCIATES, INC. (MARCH 2007). A JURISDICTIONAL DETERMINATION IS PENDING.
4. WETLANDS WERE DELINEATED AND SURVEYED BY HILLIS-CARNES ENGINEERING, INC. IN LATE SUMMER AND FALL OF 2000. THE ARMY CORPS OF ENGINEERS JURISDICTIONAL DETERMINATION WAS OBTAINED ON JUNE 11, 2003.
5. PROPOSED KING FARM DEVELOPMENT PLANIMETRICS WERE PROVIDED BY SUSSEX COUNTY (OCT. 2010)
6. WETLANDS WERE DELINEATED AND SURVEYED BY JCM ENVIRONMENTAL (2007).

800 0 800 1600

SCALE: 1"=800' FEET

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RUNWAY 4-22 - ALTERNATIVE 2
SUSSEX COUNTY AIRPORT

DRAWN BY:	LKH	CHECKED BY:	RGL	SCALE:	1" = 800'	DATE:	NOVEMBER 2010

EXHIBIT 3-2

DRAWING: 09132-exh-alternative 2.dwg LAYOUT: L1

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3. Alternative 3

Alternative 3 proposes to extend Runway 4-22 and a partial parallel taxiway 500 feet to the south to provide the recommended 5,500 feet of runway length.

The Runway 22 RPZ would not require additional fee simple acquisition. Approximately 5 additional acres of fee simple acquisition would be required for land within the Runway 4 RPZ. No additional avigation easement acquisition would be necessary to clear obstructions due to the proposed runway extension as the obstructions are located on existing airport or County property and areas which avigation easement would be purchased to clear existing obstructions.

The alternative can be developed at an estimated cost of $5.0 million, see **Table 3-4** for details. **Exhibit 3-3** illustrates this alternative.

Advantages:

- Obstructions removed to enhance operational safety.
- Runway length increased to 5,500 feet.

Disadvantages:

- Approximately 0.1 acres of wetland impacts from obstruction removal (mitigation should not be required)

Table 3-4
Sussex County Airport
Runway Alternative 3 Estimated Costs

NO.	PROJECT	ESTIMATED COSTS
1	Runway Extension (including safety area)	$4,400,000
2	Install MALS	$400,000
3	Land Costs[1]	$200,000
4	Clearing/Grubbing[2]	$30,000
	ESTIMATED TOTAL ALTERNATIVE 3	**5,030,000**

Note: [1]Land costs estimated using $40,000 per acre for fee simple and avigation easement costs were based upon $10,000 per acre (25% of fee simple cost); based upon information from County.
[2]Cost estimated for removal of obstructions in addition to those identified in Alternative 1 as 'existing'.
Source: Delta Airport Consultants, Inc.

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) (500' X 700' X 1,000')

EXISTING RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED APPROACH RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 3/4 MILE, (1,000' X 1,510' X 1,700')

PROPOSED APPROACH RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

EXISTING RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED OBSTRUCTION AREA (1± ACRES)

IMPACTED WETLANDS (0.1± ACRES)

PROPOSED EASEMENT (8± ACRES)

PROPOSED FEE SIMPLE ACQUISITION (0.5± ACRES)

PROPOSED FEE SIMPLE ACQUISITION (0.1± ACRES)

PROPOSED EASEMENT (9± ACRES)

RELOCATED PAPI

EXISTING PAPI

EXISTING RUNWAY 4-22 (5,000' X 150')
PROPOSED RUNWAY 4-22 (5,500' X 150')

EXISTING PAPI

RELOCATED PAPI

IMPACTED WETLANDS (0.3± ACRES)

PROPOSED OBSTRUCTION AREA (0.1± ACRES)

PROPOSED IMPACTED WETLANDS (0.1± ACRES)

IMPACTED WETLANDS (0.01± ACRES)

PROPOSED FEE SIMPLE ACQUISITION (4± ACRES)

IMPACTED WETLANDS (1± ACRES)

PROPOSED OBSTRUCTION AREA (4± ACRES)

PROPOSED OBSTRUCTION AREA (0.4± ACRES)

PROPOSED OBSTRUCTION LIGHT

IMPACTED WETLANDS (0.1± ACRES)

IMPACTED WETLANDS (1.2± ACRES)

PROPOSED KING FARM DEVELOPMENT

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

LEGEND		
EXISTING	DESCRIPTION	PROPOSED
	SURVEYED BOUNDARY (SEE NOTE 1)	
	COUNTY OWNED PROPERTY (SEE NOTE 2)	NA
	PAVEMENT	
RPZ	APPROACH RUNWAY PROTECTION ZONE	RPZ
NA	DEPARTURE RUNWAY PROTECTION ZONE	RPZ
ROFA	RUNWAY OBJECT FREE AREA	ROFA
RSA	RUNWAY SAFETY AREA	RSA
	DEMOLITION	NA
	AVIGATION EASEMENT	
NA	FEE SIMPLE ACQUISITION	
	OBSTRUCTION AREAS	
	WETLANDS (SEE NOTE 3)	NA
	WETLANDS (SEE NOTE 4)	NA
	WETLANDS (SEE NOTE 6)	NA
	IMPACTED WETLANDS	NA

NOTES:

1. AIRPORT BOUNDARY BASED ON SEALED SURVEY BY MCCRONE LAND SURVEY 2002.
2. GENERAL AREA OF COUNTY OWNED PROPERTY 2010 (PROVIDED BY AIRPORT OWNER).
3. WETLANDS WERE DELINEATED AND SURVEYED BY RETTEW ASSOCIATES, INC. (MARCH 2007). A JURISDICTIONAL DETERMINATION IS PENDING.
4. WETLANDS WERE DELINEATED AND SURVEYED BY HILLIS-CARNES ENGINEERING, INC. IN LATE SUMMER AND FALL OF 2000. THE ARMY CORPS OF ENGINEERS JURISDICTIONAL DETERMINATION WAS OBTAINED ON JUNE 11, 2003.
5. PROPOSED KING FARM DEVELOPMENT PLANIMETRICS WERE PROVIDED BY SUSSEX COUNTY (OCT. 2010).
6. WETLANDS WERE DELINEATED AND SURVEYED BY JCM ENVIRONMENTAL (2007).

DECLARED DISTANCES (FT)				
RUNWAY END ID	ASDA	LDA	TORA	TODA
RUNWAY 4	5,500	5,130	5,500	5,500
RUNWAY 22	5,500	5,330	5,500	5,500

800 0 800 1600

SCALE: 1"=800' FEET

www.deltaairport.com

RUNWAY 4-22 - ALTERNATIVE 3
SUSSEX COUNTY AIRPORT

DRAWN BY:	LKH	CHECKED BY:	RGL	SCALE:	1" = 800'	DATE:	NOVEMBER 2010

EXHIBIT 3-3

DRAWING: 09132-exh-alternative 3.dwg LAYOUT: L-1

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D. SELECTION OF PREFERRED ALTERNATIVE

In order to select the preferred alternative, the advantages and disadvantages of each alternative were compared in an evaluation matrix. **Table 3-5** presents the key elements of comparison.

Table 3-5
Sussex County Airport
Alternatives Evaluation Matrix

Criteria	Alternative 1 – No Build	Alternative #2	Alternative #3
Provides for additional runway length with declared distances	No	Yes	Yes
Achieves ARC B-II design standards	Yes	Yes	Yes
Achieves lower approach visibility minimums with approach lighting system	No	Yes	Yes
Requires runway closure for construction	No	Yes	Yes
Airport disruptions and/or constraints on activity during construction	No	Significant	Moderate
Wetlands Impacts	Yes	Yes	Yes
Property interest acquisition (approximate acres)	~17 ac – Avigation Easement	~6 ac – Fee Simple	~5 ac – Fee Simple
Approximate Cost	$645,000	$6.5 million	$5.0 million

Source: Delta Airport Consultants, Inc. Analysis

After evaluation of the three alternatives for runway development, **Alternative 3 is recommended as the preferred operational alternative.**

Alternative 1 does not provide the recommended runway length. Alternative 2 provides the recommended runway length; however, it requires wetland impacts outside of obstruction

removal, increases project cost by approximately 25 percent, and requires twice the operational coordination as Alternative 3 due to construction required at both ends of the primary runway.

Consequently, as Alternative 3 offers the ability to provide the recommended runway length of 5,500 feet to serve the current and forecasted critical aircraft demand, it is the preferred operational alternative. Alternative 3 has an estimated development cost of $5.0 million.

E. RUNWAY LIGHTING AND MARKING – PREFERRED ALTERNATIVE

Installation of an approach lighting system will be required to reduce the approach minima below one mile. The approved ALP depicts a MALSR installation south of the proposed 1,300 foot extension. A MALS is recommended in conjunction with the proposed 500 foot extension so as to allow relocation and expansion to MALSR or MALSF with the ultimate runway extension.

The end of pavement elevation for the initial 500 foot extension would be raised approximately one foot from the existing Runway 4 threshold elevation and the first two light bars of the MALS would be installed 'in pavement' with the remaining bars on towers as appropriate to establish the required light plane clearance over Truck Route 9. The proposed MALS installation and runway marking plan are highlighted in **Exhibit 3-4.**

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) (500' X 700' X 1,000')

PROPOSED FEE SIMPLE ACQUISITION (0.5± ACRES)

EXISTING RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED MALS

RELOCATED PAPI

EXISTING PAPI

PROPOSED APPROACH RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

EXISTING RUNWAY 4-22 (5,000' X 150')
PROPOSED RUNWAY 4-22 (5,500' X 150')

PROPOSED MALS (IN PAVEMENT)

RELOCATED PAPI

EXISTING PAPI

PROPOSED DEPARTURE RUNWAY PROTECTION ZONE (RPZ) VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

PROPOSED FEE SIMPLE ACQUISITION (4± ACRES)

PROPOSED APPROACH RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 3/4 MILE (1,000' X 1,510' X 1,700')

EXISTING RUNWAY PROTECTION ZONE (RPZ), VISIBILITY ≥ 1 MILE (500' X 700' X 1,000')

LEGEND		
EXISTING	DESCRIPTION	PROPOSED
	SURVEYED BOUNDARY (SEE NOTE 1)	
	COUNTY OWNED PROPERTY (SEE NOTE 2)	NA
	PAVEMENT	
RPZ	APPROACH RUNWAY PROTECTION ZONE	RPZ
NA	DEPARTURE RUNWAY PROTECTION ZONE	RPZ
ROFA	RUNWAY OBJECT FREE AREA	ROFA
RSA	RUNWAY SAFETY AREA	RSA
	DEMOLITION	NA
NA	FEE SIMPLE ACQUISITION	

NOTES:

1. AIRPORT BOUNDARY BASED ON SEALED SURVEY BY MCCRONE LAND SURVEY 2002.
2. GENERAL AREA OF COUNTY OWNED PROPERTY 2010 (PROVIDED BY AIRPORT OWNER).

500 0 500 1000
SCALE: 1"=500' FEET

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RUNWAY 4-22 PROPOSED LIGHTING AND MARKING
SUSSEX COUNTY AIRPORT

DRAWN BY:	LKH	CHECKED BY:	RGL	SCALE:	1" = 500'	DATE:	NOVEMBER 2010

EXHIBIT 3-4

DRAWING: 09132-exh-alternativeMALS.dwg LAYOUT: L1

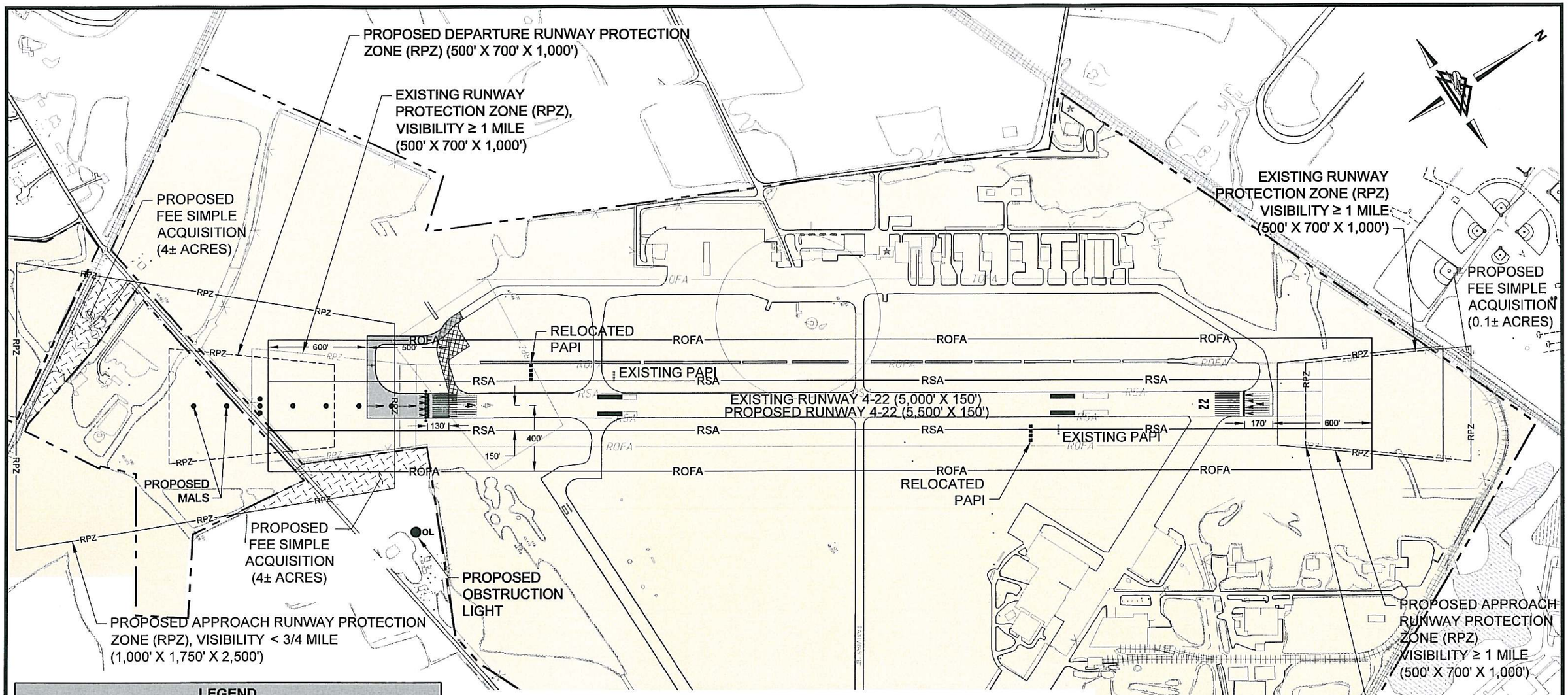
F. APPROACH MINIMUM REDUCTION EVALUATION – RUNWAY 4

An evaluation of the feasibility to reduce Runway 4 instrument approach minima to lower than three-quarter mile in conjunction with Alternative 3 was conducted. The evaluation considered the controlling obstruction for the existing RNAV (GPS) approach procedure as well as the objects identified during the 2009 Obstruction Survey provided by the Owner. An evaluation of the approach lighting system and runway marking plan proposed for Alternative 3 was also conducted and is presented in the below text and depicted on **Exhibit 3-5**.

Key elements in the determining the feasibility of reducing approach minima to lower than three-quarter mile are the expanded RSA and ROFA that result when the approach minima are reduced. For an ARC B-II airport, the length beyond end of runway for both areas double from 300 feet to 600 feet, and the ROFA width expands from 500 feet to 800 feet. The result of this expansion at GED is greater constraint due to the railroad to the north and Truck Route 9 to the south establishing the parameters of development. These parameters are not expandable within the scope of the proposed project.

To accommodate the expanded Runway 4 ROFA, the southeast corner of the area would require earthwork fill to approximately 60 MSL to achieve the vertical clearance required over Truck Route 9. Raising the elevation in excess of ten feet above the current Runway 4 threshold would require construction of a vertical curve in the runway extension and possibly require reconstruction of a portion of the existing runway. The extension to the south would be limited to approximately 435 feet, thereby requiring extension to the Runway 22 end (similar to the concept eliminated from further consideration in Alternative 2) to achieve the recommended 5,500 foot runway length.

The controlling obstruction for the current RNAV (GPS) approach to Runway 4 is a tower located approximately 1.3 miles from the existing threshold. Relocation of this tower and removal of groups of trees that penetrate the existing and proposed 34:1 approach slope would be a key requirement to reduce RNAV approach minima from the existing 1 to 1-1/2 mile visibility to as low as three quarter mile.



LEGEND		
EXISTING	DESCRIPTION	PROPOSED
	SURVEYED BOUNDARY (SEE NOTE 1)	
	COUNTY OWNED PROPERTY (SEE NOTE 2)	NA
	PAVEMENT	
RPZ	APPROACH RUNWAY PROTECTION ZONE	RPZ
NA	DEPARTURE RUNWAY PROTECTION ZONE	RPZ
ROFA	RUNWAY OBJECT FREE AREA	ROFA
RSA	RUNWAY SAFETY AREA	RSA
	DEMOLITION	NA
NA	FEE SIMPLE ACQUISITION	

NOTES:

1. AIRPORT BOUNDARY BASED ON SEALED SURVEY BY MCCRONE LAND SURVEY 2002.
2. GENERAL AREA OF COUNTY OWNED PROPERTY 2010 (PROVIDED BY AIRPORT OWNER).
3. PROPOSED KINGS FARM DEVELOPMENT PLANIMETRICS WERE PROVIDED BY SUSSEX COUNTY (OCT. 2010). WETLANDS WERE DELINEATED & SURVEYED BY JCM ENVIRONMENTAL (2007)

DECLARED DISTANCES (FT)				
RUNWAY END ID	ASDA	LDA	TORA	TODA
RUNWAY 4	5,500	5,130	5,500	5,500
RUNWAY 22	5,500	5,330	5,500	5,500

600 0 600 1200

SCALE: 1"=600' FEET

www.deltaairport.com

PREFERRED RUNWAY DEVELOPMENT-RW 4 HALF MILE VISIBILITY APPROACH
SUSSEX COUNTY AIRPORT

DRAWN BY: LKH | CHECKED BY: RGL | SCALE: 1" = 600' | DATE: NOVEMBER 2010

EXHIBIT 3-5

DRAWING: 09132-exh-alternative 5_PREF-RW-DEV.dwg LAYOUT: L1